WHAT IS CLAIMED IS:

1. A method of operating in a network in which a plurality of stations communicate over a shared medium, comprising

providing a physical layer for handling physical communication over the shared medium;

providing a high level layer that receives data from the station and supplies high level data units for transmission over the medium;

providing a MAC layer that receives the high level data units from the high level layer and supplies low level data units to the physical layer;

at the MAC layer, encapsulating content from a plurality of the high level data units;

dividing the encapsulated content into a plurality of pieces with each piece capable of being independently retransmitted; and

supplying low level data units containing one or more of the plurality of pieces.

2. The method of claim 1 wherein at least some information common to the encapsulated high level data units is not repeated for each high level data unit encapsulated in a low level data unit.

3. The method of claim 2 wherein the information common to the encapsulated high level data units comprises destination and source addresses.

4. The method of claim 2 wherein the high level data units each comprise a payload, and encapsulating comprises forming a queue comprising the payloads from a succession of high level data.

5. The method of claim 4 wherein the queue comprises a succession of sub-frames, each sub-frame comprising a header and a plurality of payloads.

6. The method of claim 5 wherein each sub-frame is divided into the plurality of pieces capable of being independently retransmitted.

7. The method of claim 6 wherein division of a sub-frame into the plurality of pieces comprises dividing the sub-frame into a plurality of sub-blocks, and forming at least some pieces from a plurality of sub-blocks.

8. The method of claim 7 wherein each piece constitutes a segment that is transmitted as a physical layer block.

9. The method of claim 1 further comprising parity pieces derived from other pieces and capable of being used at a destination to recover one or more lost pieces at the destination without having to retransmit the lost pieces.

10. The method of claim 9 wherein each piece is transmitted as a physical layer block, and the parity pieces are also transmitted as parity physical layer blocks.

11. The method of claim 10 wherein the physical layer blocks are encoded using forward error correction.

12. The method of claim 1 wherein some of the pieces making up a low level data unit constitute retransmitted pieces that failed to be correctly transmitted in an earlier attempt.

13. The method of claim 12 wherein at least some retransmitted pieces are transmitted with greater forward error correction.

14. The method of claim 5 wherein each sub-frame further comprises a delivery time stamp associated with at least some payloads.

15. The method of claim 5 wherein clock information characterizing the time setting of a clock in a transmitting station is transmitted to a receiving station within a header of the low level data units, and the clock information is used by the receiving station along with the delivery time stamps to establish the time at which payloads are delivered.

16. The method of claim 15 wherein the time at which a payload is delivered is set to be substantially the time specified by the time stamp.

17. The method of claim 5 further comprising an integrity check value associated with each sub-frame or with a plurality of sub-frames.

18. The method of claim 5 wherein each of the plurality of payloads in a sub-frame have identical length.

19. The method of claim 5 wherein each sub-frame further comprises MAC management information.

20. The method of claim 4 wherein the MAC layer has the capability of transmitting data in a plurality of sessions within a regularly-repeated contention free interval, wherein a station to which data is transmitted is identified by a destination address and a station from which data is transmitted is identified by a source address, and wherein the queue contains payloads for the same session, same source address, and same destination address.

21. The method of claim 5 wherein the MAC layer has the capability of transmitting data in a plurality of sessions within a regularly-repeated contention free interval, wherein a station to which data is transmitted is identified by a destination address and a station from which data is transmitted is identified by a source address, and wherein the queue contains sub-frames for the same session, same source address, and same destination address.

22. The method of claim 20 or 21 wherein the sessions are transmitted in a substantially contention-free manner.

23. The method of claim 22 wherein the sessions are transmitted within time slots of a regularly-repeated contention-free interval.

24. The method of claim 20 or 21 wherein a stream identifier (e.g., MSID) is used to associate content of a queue with a particular session.

25. The method of claim 24 wherein the stream identifier is also used to associate content of a queue with a priority level for contention-based transmission over the medium.

26. The method of claim 24 wherein there are a plurality of queues, each containing payloads having a unique combination of stream identifier, source address, and destination address.

27. The method of claim 26 wherein each queue contains a payload having a unique combination of stream identifier, source address, destination address, and type of high level layer.

28. The method of claim 5 wherein the queue is divided into a plurality of sub-blocks, wherein a plurality of sub-blocks are grouped to form a segment, with a segment crossing sub-frame boundaries in the queue, wherein a segment constitutes one of the pieces.

29. The method of claim 28 wherein each sub-block is shorter than a sub-frame.

30. The method of claim 8 or 28 wherein at least some segments contain a number of sub-blocks corresponding to other than an integral number of sub-frames.

31. The method of claim 28 wherein the sub-blocks are of equal length.

32. The method of claim 28 wherein the sub-blocks have an associated sequential numbering adapted for use at the receiving station for re-establishing the correct sequential order of the sub-blocks.

33. The method of claim 32 wherein the sub-blocks have a predetermined size, which combined with the associated sequential numbering, eliminates the need for buffer reordering when out of order segments are received.

34. The method of claim 33 wherein the sub-blocks are of equal size.

35. The method of claim 8 or 28 further comprising, for at least some of the low level data units, forming the low level data unit from a plurality of segments.

36. The method of claim 35 wherein each segment in the low level data unit forms the body of a separate block transmitted by the physical layer.

37. The method of claim 35 wherein individual segments are individually encrypted.

38. The method of claim 37 wherein encryption information common to a plurality of segments is carried in a header.

39. The method of claim 38 wherein some encryption information is carried in a header and frame control of the low level data unit and in a header of the block.

40. The method of claim 37 wherein some encryption information is carried in frame control of the low level data unit and in a header of the block.

41. The method of claim 36 wherein each block separately undergoes forward error correction, and forward error correction bits for each block are transmitted in the low level data unit.

42. The method of claim 41 wherein the level of forward error correction used is different for different blocks.

43. The method of claim 42 wherein the level of forward error correction used provides greater error correction capability for selected blocks that are being retransmitted after failing to be correctly transmitted in an earlier attempt.

44. The method of claim 36 wherein most of the blocks are identical in length.

45. The method of claim 44 wherein the initial and final block of a low level data unit can be of a different length than the remaining blocks.

46. The method of claim 35 wherein information common to the plurality of segments forming the low level data unit is transmitted in a header for the low level data unit.

47. The method of claim 41 wherein the information common to the plurality of segments is transmitted only in the header.

48. The method of claim 41 wherein the low level data unit further comprises a frame control field.

49. A method of operating in a network in which a plurality of stations communicate over a shared medium, comprising

providing a physical layer for handling physical communication over the shared medium;

providing a high level layer that receives data from the station and supplies high level data units for transmission over the medium;

providing a MAC layer that receives the high level data units from the high level layer and supplies low level data units to the physical layer;

at the MAC layer, forming low level data units by encapsulating content from a plurality of the high level data units; and

adaptively escalating the robustness of transmission of the low level data units depending on the frequency of transmission errors.

50. The method of claim 49 wherein

the method further comprises incorporating forward-error correction information into the transmitted stream of low level data units, and

wherein the step of adaptively escalating comprises adaptively varying the forward-error correction information depending on the frequency of transmission errors.

51. The method of claim 50 wherein varying the forward-error correction information comprises varying one or both of the amount and type of forward-error correction information.

52. The method of claim 49 wherein decisions on adaptively escalating are made at a transmitting station.

53. The method of claim 50 wherein the low level data units comprise a plurality of pieces (e.g., segments).

54. The method of claim 52 wherein the forward error correction information comprises information associated with provided with the pieces for use at a destination for recovering a piece that is received with errors.

55. The method of claim 52 wherein the forward error correction information comprises parity pieces derived from other pieces and capable of being used at a destination to recover one or more lost pieces at the destination without having to retransmit the lost pieces.

56. The method of claim 55 wherein each piece is transmitted as a physical layer block, and the parity pieces are also transmitted as parity physical layer blocks.